US009344679B2

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Uchiyama

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(54) **TRANSMISSION SYSTEM, TRANSMISSION TERMINAL AND METHOD OF TRANSMITTING PROGRAM**

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(51) **Int. Cl.**

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H04M 1/24	(2006.01)
H04N 7/15	(2006.01)
G06F 21/34	(2013.01)
H04M 3/56	(2006.01)
G06F 21/12	(2013.01)

(52) **U.S. Cl.**

CPC ***H04N 7/15*** (2013.01); ***G06F 21/12*** (2013.01); ***G06F 21/34*** (2013.01); ***H04M 3/56*** (2013.01); *G06F 2221/2101* (2013.01); *G06F 2221/2151* (2013.01)

(58) **Field of Classification Search**

CPC H04N 7/15; H04N 17/004; H04N 17/045; H04N 1/0097

USPC 348/14.01, 14.08, 14.12; 379/1.01, 379/9.02, 15.03, 26.01, 27.01

See application file for complete search history.

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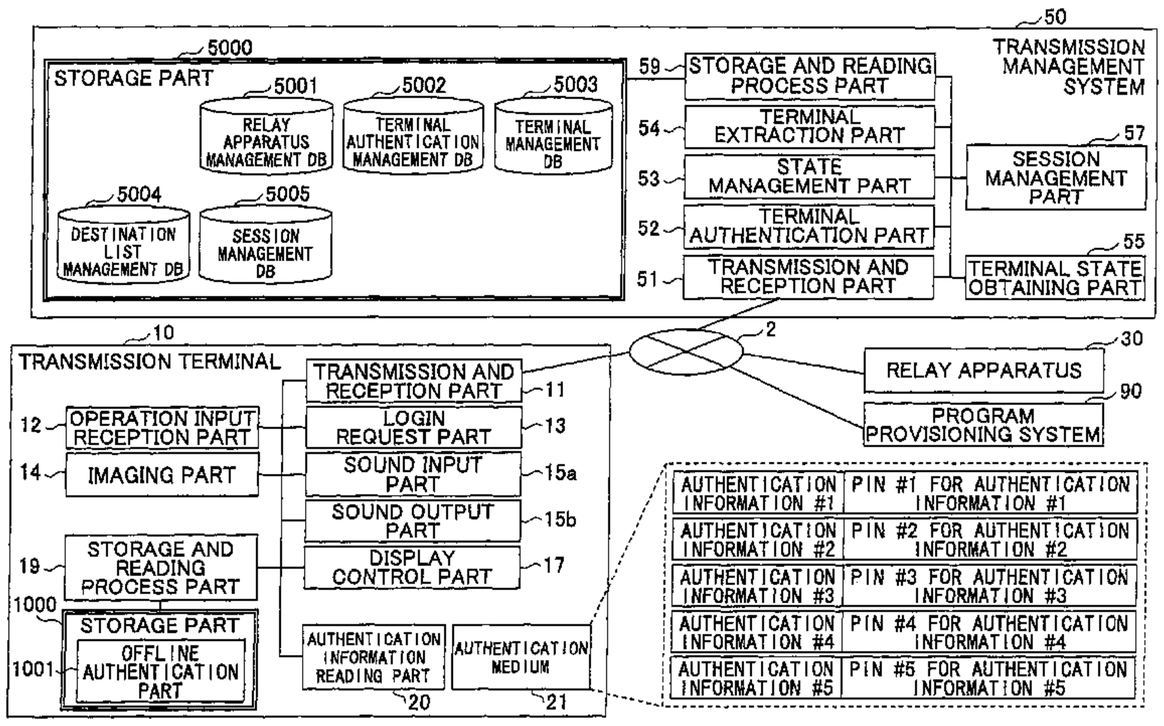
(57) **ABSTRACT**

A transmission terminal transmits content data to another transmission terminal via a network. A transmission management system processes a session among a plurality of the transmission terminals or for the single transmission terminal. The transmission terminal requests a user to input execution authentication information when an authentication medium is connected thereto. The authentication medium associates program identification information with the execution authentication information and stores them. The transmission terminal determines whether the execution information from the user is coincident with the stored one and transmits the associated program identification information to the transmission management system at a time of coincidence. The transmission management system then transmits a transmission instruction to the program providing apparatus to transmit the corresponding program to the transmission terminal.

10 Claims, 14 Drawing Sheets



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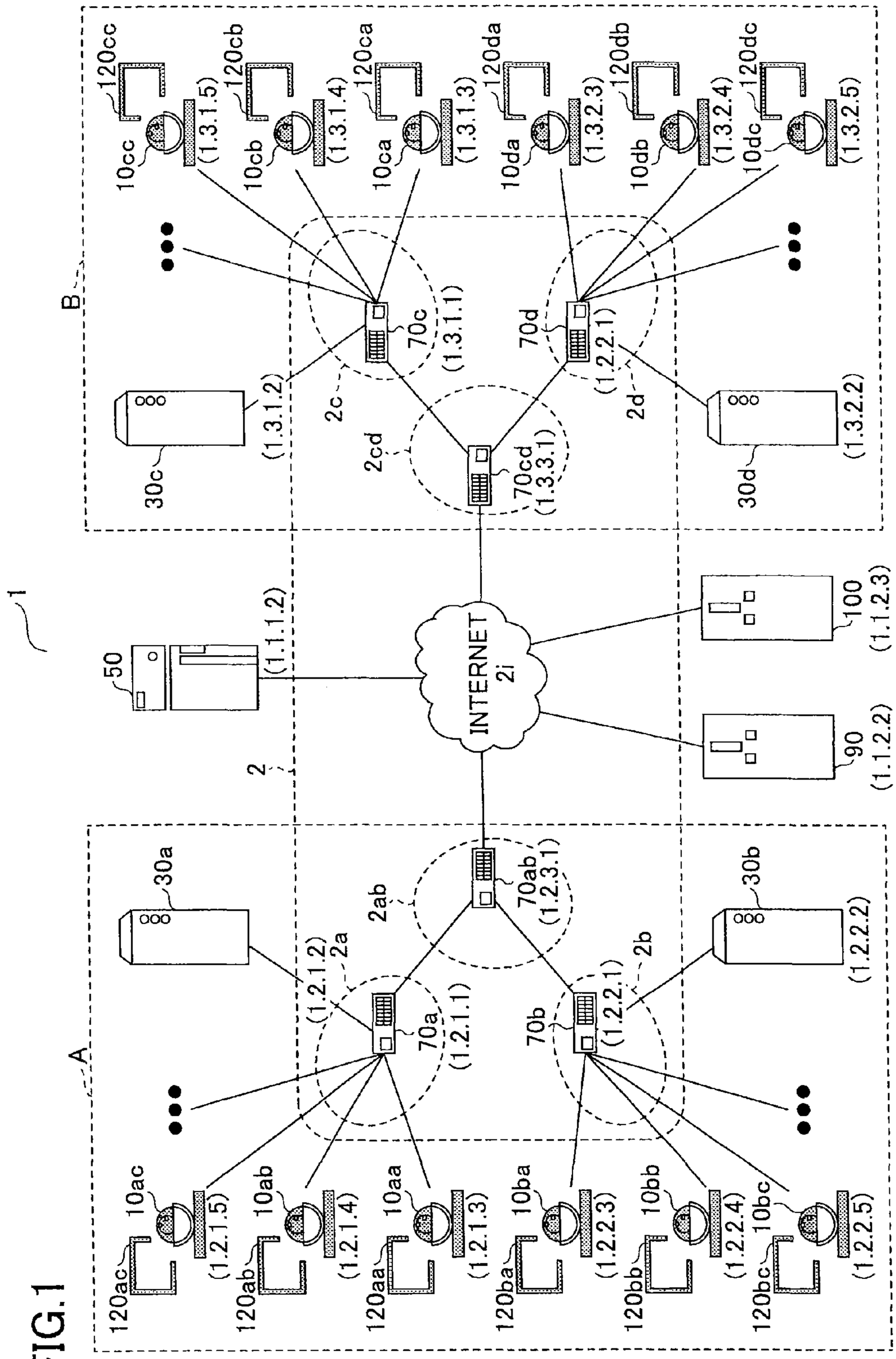

1
2
2i
INTERNET
50
(1.1.1.2)
100
(1.1.2.3)
90
(1.1.2.2)
A
B
30a
30b
30c
30d
(1.2.2.2)
(1.3.1.2)
(1.3.2.2)
70a
(1.2.1.1)
70b
(1.2.2.1)
70c
(1.3.1.1)
70d
(1.3.2.1)
70ab
(1.2.3.1)
70cd
(1.3.3.1)
2a
2b
2c
2d
2ab
2cd
10ac
10ab
10aa
10ba
10bb
10bc
10cc
10cb
10ca
10da
10db
10dc
120ac
120ab
120aa
120ba
120bb
120bc
120cc
120cb
120ca
120da
120db
120dc
(1.2.1.5)
(1.2.1.4)
(1.2.1.3)
(1.2.2.3)
(1.2.2.4)
(1.2.2.5)
(1.3.1.5)
(1.3.1.4)
(1.3.1.3)
(1.3.2.3)
(1.3.2.4)
(1.3.2.5)

FIG.1

FIG.2

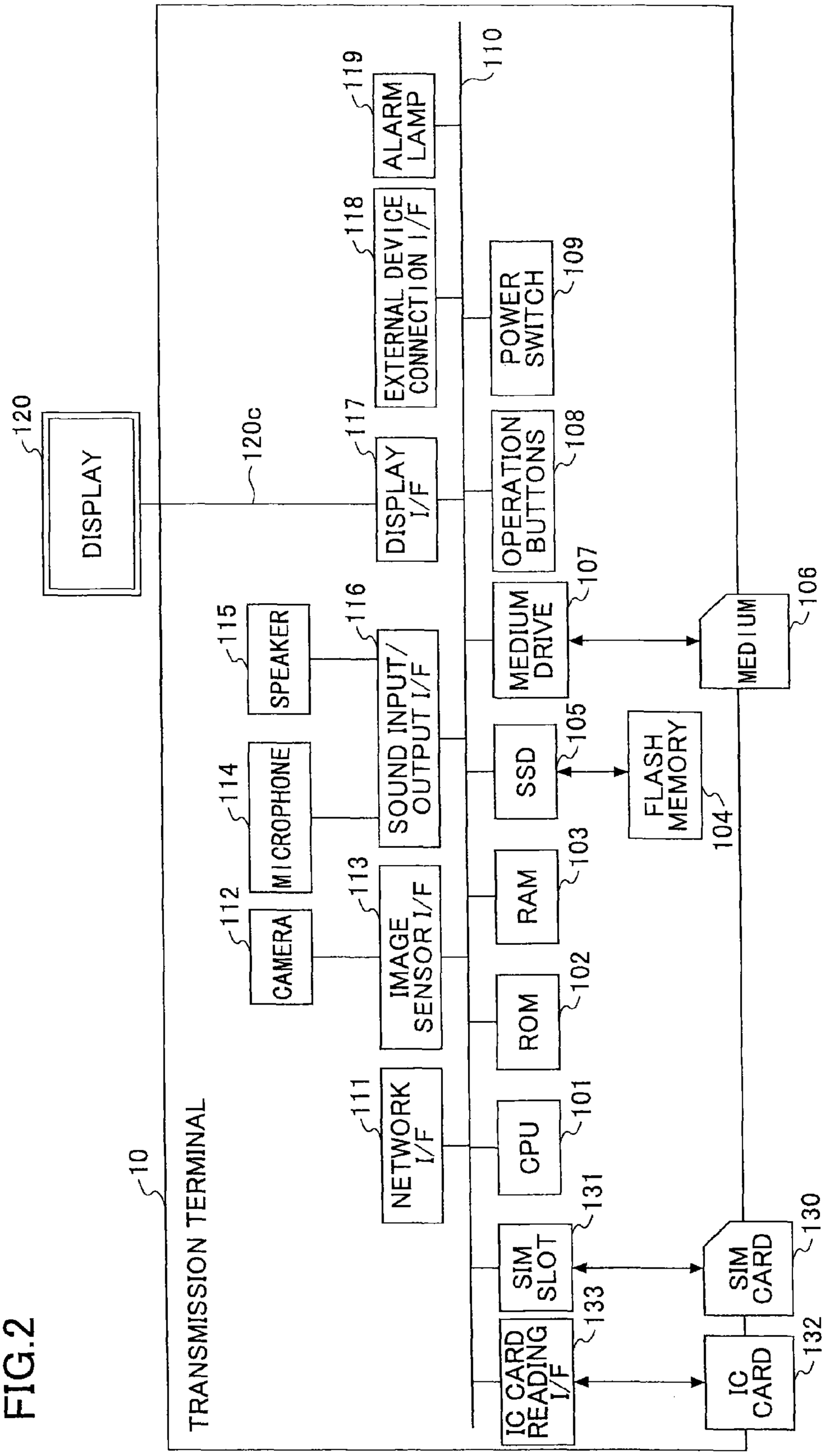

TRANSMISSION TERMINAL
10
DISPLAY
120
120c
DISPLAY I/F
117
EXTERNAL DEVICE CONNECTION I/F
118
ALARM LAMP
119
110
POWER SWITCH
109
OPERATION BUTTONS
108
MEDIUM DRIVE
107
MEDIUM
106
SPEAKER
115
MICROPHONE
114
SOUND INPUT/ OUTPUT I/F
116
CAMERA
112
IMAGE SENSOR I/F
113
SSD
105
FLASH MEMORY
104
RAM
103
ROM
102
NETWORK I/F
111
CPU
101
SIM SLOT
131
IC CARD READING I/F
133
SIM CARD
130
IC CARD
132

FIG.3

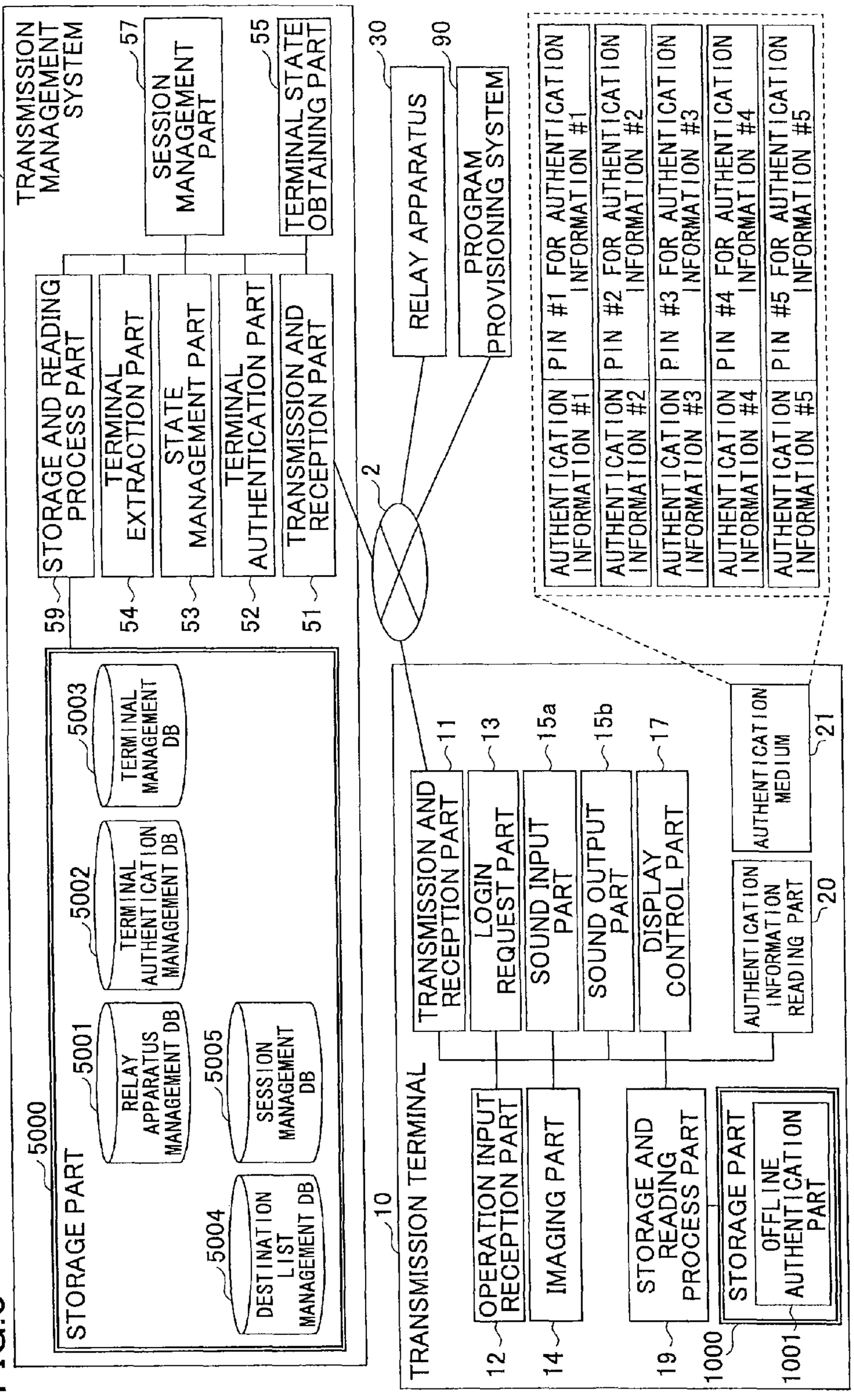

TRANSMISSION MANAGEMENT SYSTEM
50
SESSION MANAGEMENT PART
57
TERMINAL STATE OBTAINING PART
55
STORAGE AND READING PROCESS PART
59
TERMINAL EXTRACTION PART
54
STATE MANAGEMENT PART
53
TERMINAL AUTHENTICATION PART
52
TRANSMISSION AND RECEPTION PART
51
RELAY APPARATUS
30
PROGRAM PROVISIONING SYSTEM
90
AUTHENTICATION INFORMATION #1
PIN #1 FOR AUTHENTICATION INFORMATION #1
AUTHENTICATION INFORMATION #2
PIN #2 FOR AUTHENTICATION INFORMATION #2
AUTHENTICATION INFORMATION #3
PIN #3 FOR AUTHENTICATION INFORMATION #3
AUTHENTICATION INFORMATION #4
PIN #4 FOR AUTHENTICATION INFORMATION #4
AUTHENTICATION INFORMATION #5
PIN #5 FOR AUTHENTICATION INFORMATION #5
2
5003
TERMINAL MANAGEMENT DB
5002
TERMINAL AUTHENTICATION MANAGEMENT DB
5001
RELAY APPARATUS MANAGEMENT DB
5005
SESSION MANAGEMENT DB
5004
DESTINATION LIST MANAGEMENT DB
5000
STORAGE PART
TRANSMISSION AND RECEPTION PART
11
LOGIN REQUEST PART
13
SOUND INPUT PART
15a
SOUND OUTPUT PART
15b
DISPLAY CONTROL PART
17
AUTHENTICATION MEDIUM
21
AUTHENTICATION INFORMATION READING PART
20
TRANSMISSION TERMINAL
10
OPERATION INPUT RECEPTION PART
12
IMAGING PART
14
STORAGE AND READING PROCESS PART
19
STORAGE PART
1000
OFFLINE AUTHENTICATION PART
1001

FIG.4

RELAY APPARATUS MANAGEMENT TABLE

RELAY APPARATUS	OPERATION STATE	RECEIVED DATE AND TIME	IP ADDRESS OF RELAY APPARATUS	HIGHEST DATA TRANSMISSION RATE (Mbps)
111a	ONLINE	2009.11.10.13:00	1.2.1.2	100
111b	ONLINE	2009.11.10.13:10	1.2.2.2	1000
111c	OFFLINE	2009.11.10.13:20	1.3.1.2	100
111d	ONLINE	2009.11.10.13:30	1.3.2.2	10

FIG.5

TERMINAL AUTHENTICATION MANAGEMENT TABLE

TERMINAL ID	PASSWORD
01aa	aaaa
01ab	abab
01ba	baba
...	...

FIG.6

TERMINAL MANAGEMENT TABLE

TERMINAL ID	OPERATION STATE	RECEIVED DATE AND TIME	IP ADDRESS OF TERMINAL
01aa	ONLINE	2009.11.10.13:40	1.2.1.3
01ab	OFFLINE	2009.11.09.12:00	1.2.1.4
01ba	ONLINE	2009.11.10.13:45	1.2.2.3
...	...	...	...
01db	ONLINE	2009.11.10.13:50	1.3.2.4

FIG.7

DESTINATION LIST MANAGEMENT TABLE

REQUEST SOURCE TERMINAL ID	DESTINATION TERMINAL ID
01aa	01ab,01ba,01db
01ab	01aa,01ba,01ca
01ba	01aa,01ab,01cb,01da
...	...
01db	01aa,01ab,01da

FIG.8

SESSION MANAGEMENT TABLE

SELECTION SESSION ID	RELAY APPARATUS ID	REQUEST SOURCE TERMINAL ID	DESTINATION TERMINAL ID	DELAY TIME (ms)	DELAY INFORMATION RECEIVED DATE AND TIME
se1	111a	01aa	01db	200	2009.11.10.14:00
se2	111b	01ba	01ca	50	2009.11.10.14:10
se3	111d	01bb	01da	400	2009.11.10.14:20
...	...	...	...	...	...

FIG.9

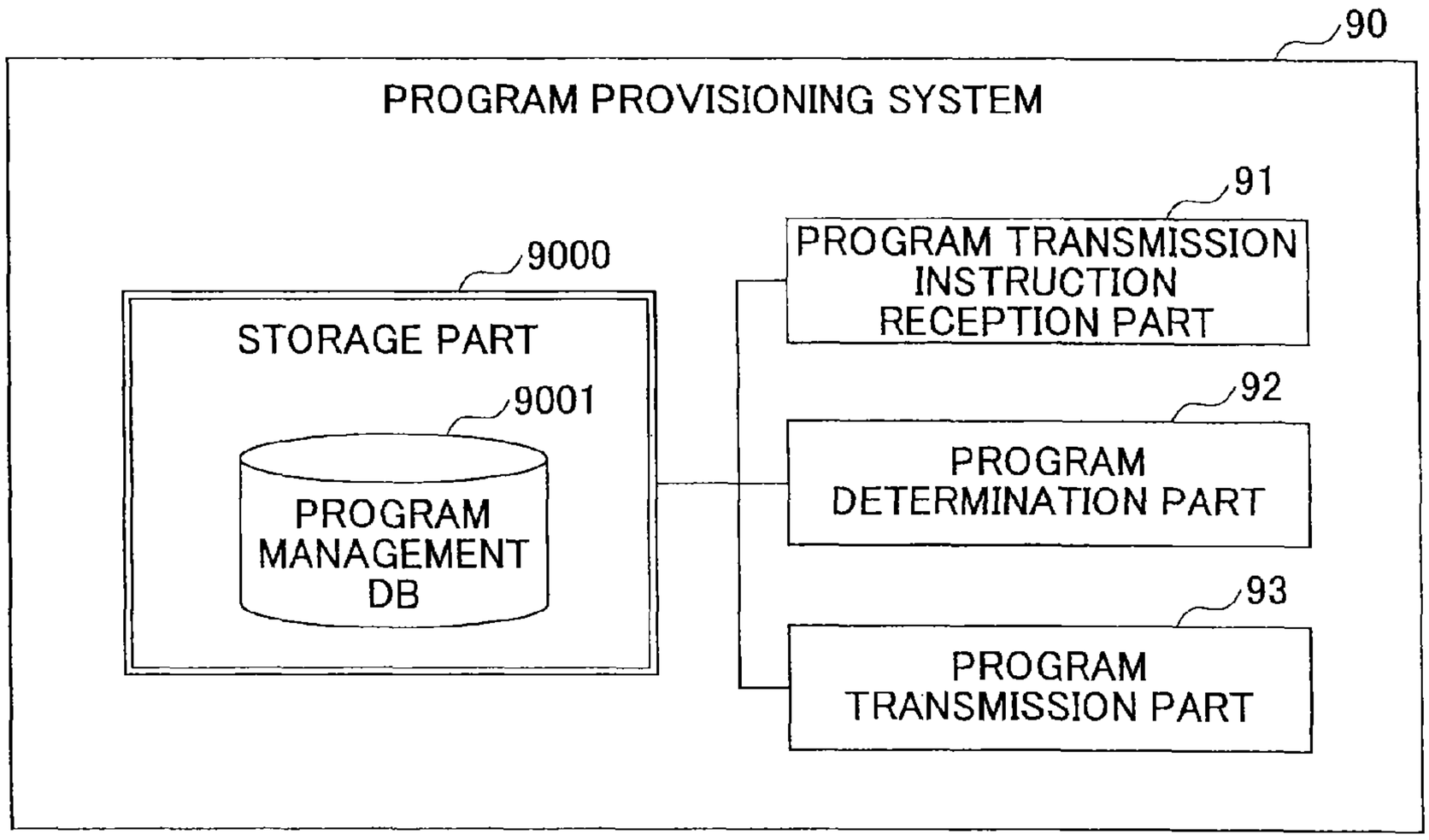


FIG.10

PROGRAM MANAGEMENT TABLE

PROGRAM IDENTIFICATION INFORMATION	ADDRESS INFORMATION OF PROGRAM
MAINTENANCE #1	C:¥Program¥Maintenance¥#1
...	...

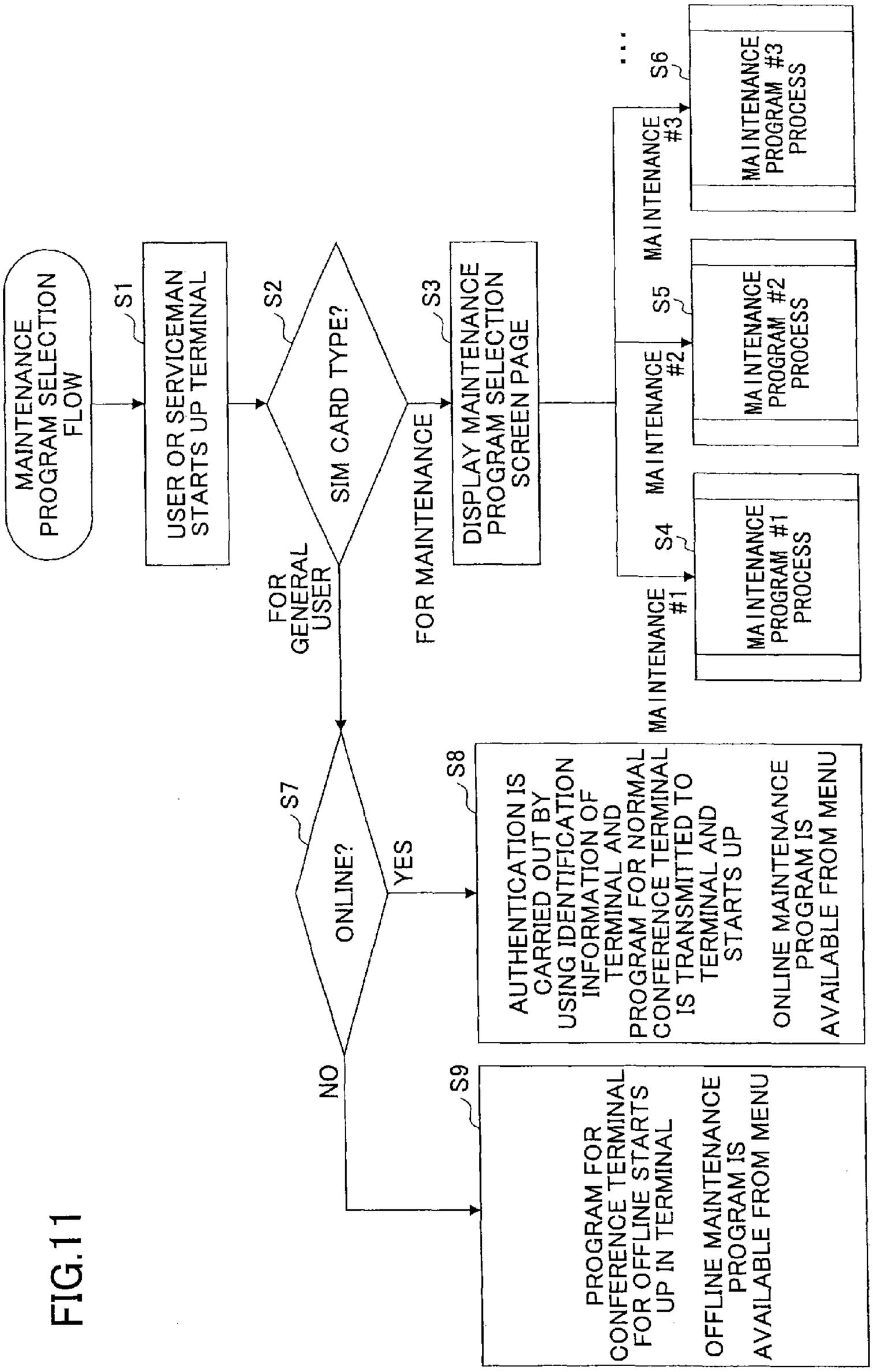

MAINTENANCE PROGRAM SELECTION FLOW
S1
USER OR SERVICEMAN STARTS UP TERMINAL
S2
SIM CARD TYPE?
FOR GENERAL USER
FOR MAINTENANCE
S3
DISPLAY MAINTENANCE PROGRAM SELECTION SCREEN PAGE
MAINTENANCE #1
S4
MAINTENANCE PROGRAM #1 PROCESS
MAINTENANCE #2
S5
MAINTENANCE PROGRAM #2 PROCESS
MAINTENANCE #3
S6
MAINTENANCE PROGRAM #3 PROCESS
...
S7
ONLINE?
YES
S8
AUTHENTICATION IS CARRIED OUT BY USING IDENTIFICATION INFORMATION OF TERMINAL AND PROGRAM FOR NORMAL CONFERENCE TERMINAL IS TRANSMITTED TO TERMINAL AND STARTS UP
ONLINE MAINTENANCE PROGRAM IS AVAILABLE FROM MENU
NO
S9
PROGRAM FOR CONFERENCE TERMINAL FOR OFFLINE STARTS UP IN TERMINAL
OFFLINE MAINTENANCE PROGRAM IS AVAILABLE FROM MENU

FIG.11

FIG.12

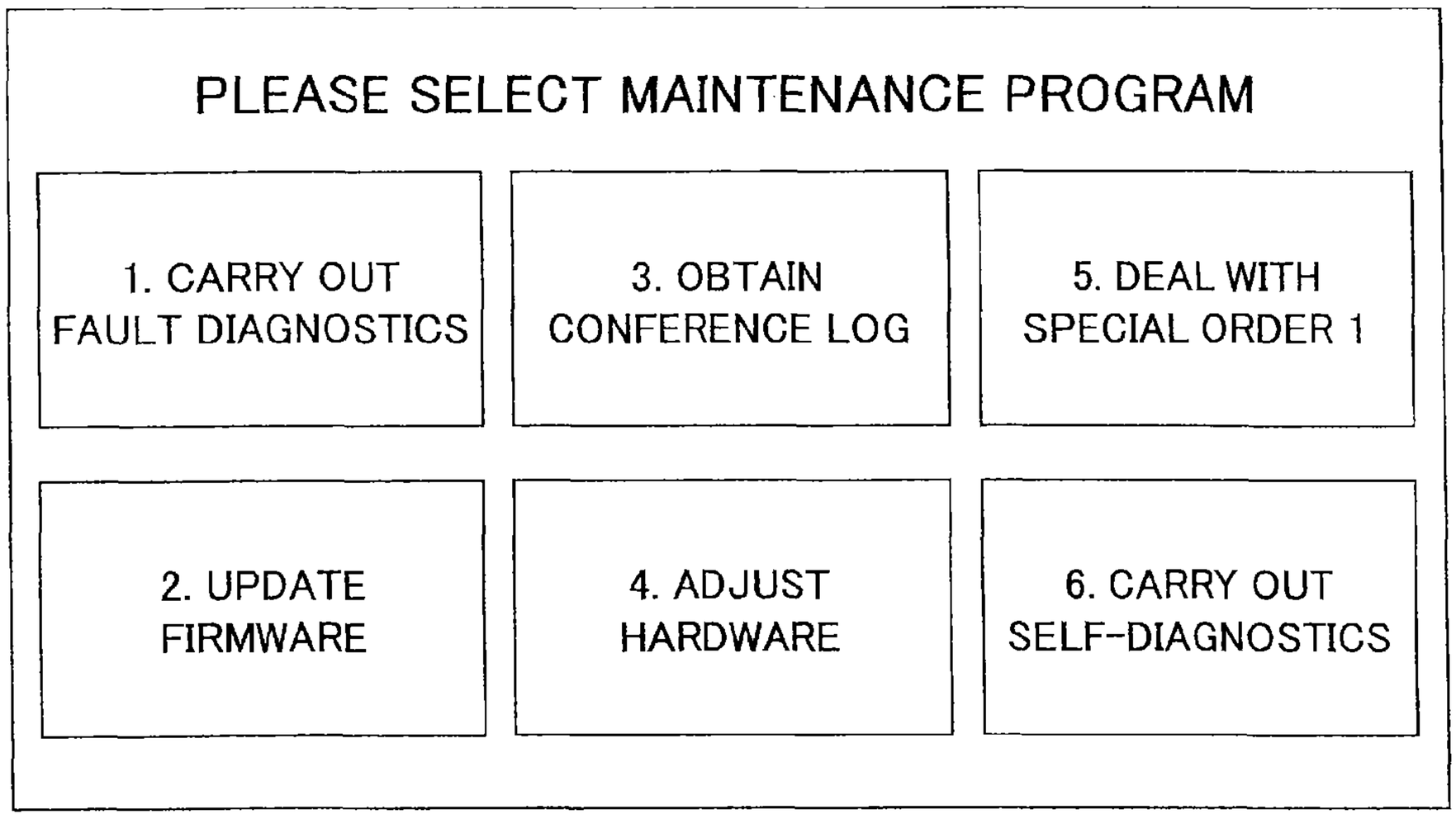

PLEASE SELECT MAINTENANCE PROGRAM
1. CARRY OUT FAULT DIAGNOSTICS
3. OBTAIN CONFERENCE LOG
5. DEAL WITH SPECIAL ORDER 1
2. UPDATE FIRMWARE
4. ADJUST HARDWARE
6. CARRY OUT SELF-DIAGNOSTICS

FIG.13

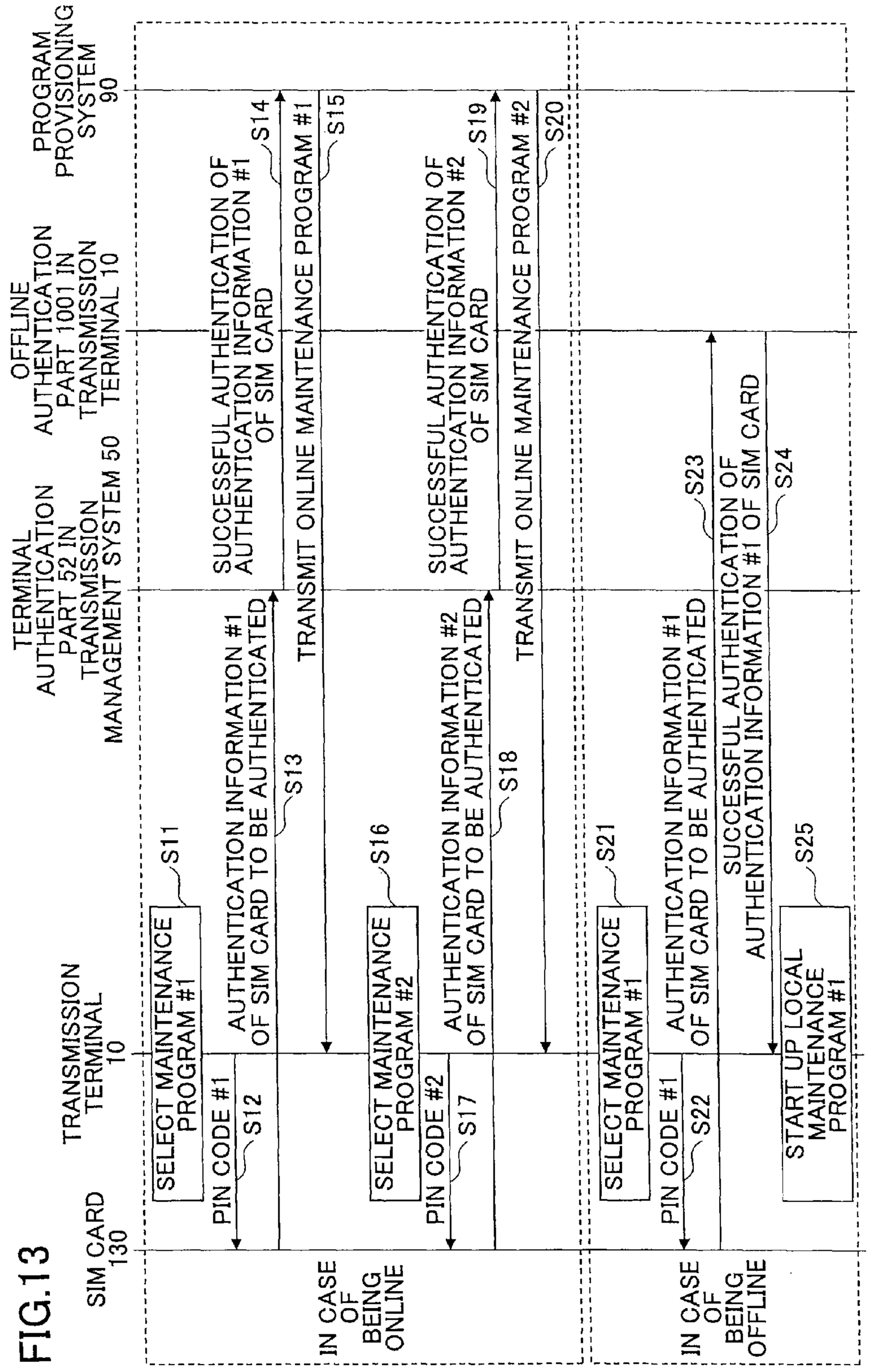

SIM CARD 130
TRANSMISSION TERMINAL 10
TERMINAL AUTHENTICATION PART 52 IN TRANSMISSION MANAGEMENT SYSTEM 50
PROGRAM PROVISIONING SYSTEM 90
IN CASE OF BEING ONLINE
SELECT MAINTENANCE PROGRAM #1
PIN CODE #1
S12
AUTHENTICATION INFORMATION #1 OF SIM CARD TO BE AUTHENTICATED
S13
TRANSMIT ONLINE MAINTENANCE PROGRAM #1
S14
SUCCESSFUL AUTHENTICATION OF AUTHENTICATION INFORMATION #1 OF SIM CARD
S15
S16
SELECT MAINTENANCE PROGRAM #2
PIN CODE #2
S17
AUTHENTICATION INFORMATION #2 OF SIM CARD TO BE AUTHENTICATED
S18
TRANSMIT ONLINE MAINTENANCE PROGRAM #2
S19
SUCCESSFUL AUTHENTICATION OF AUTHENTICATION INFORMATION #2 OF SIM CARD
S20
IN CASE OF BEING OFFLINE
S21
SELECT MAINTENANCE PROGRAM #1
PIN CODE #1
S22
AUTHENTICATION INFORMATION #1 OF SIM CARD TO BE AUTHENTICATED
S23
SUCCESSFUL AUTHENTICATION OF AUTHENTICATION INFORMATION #1 OF SIM CARD
S24
S25
START UP LOCAL MAINTENANCE PROGRAM #1

FIG.14

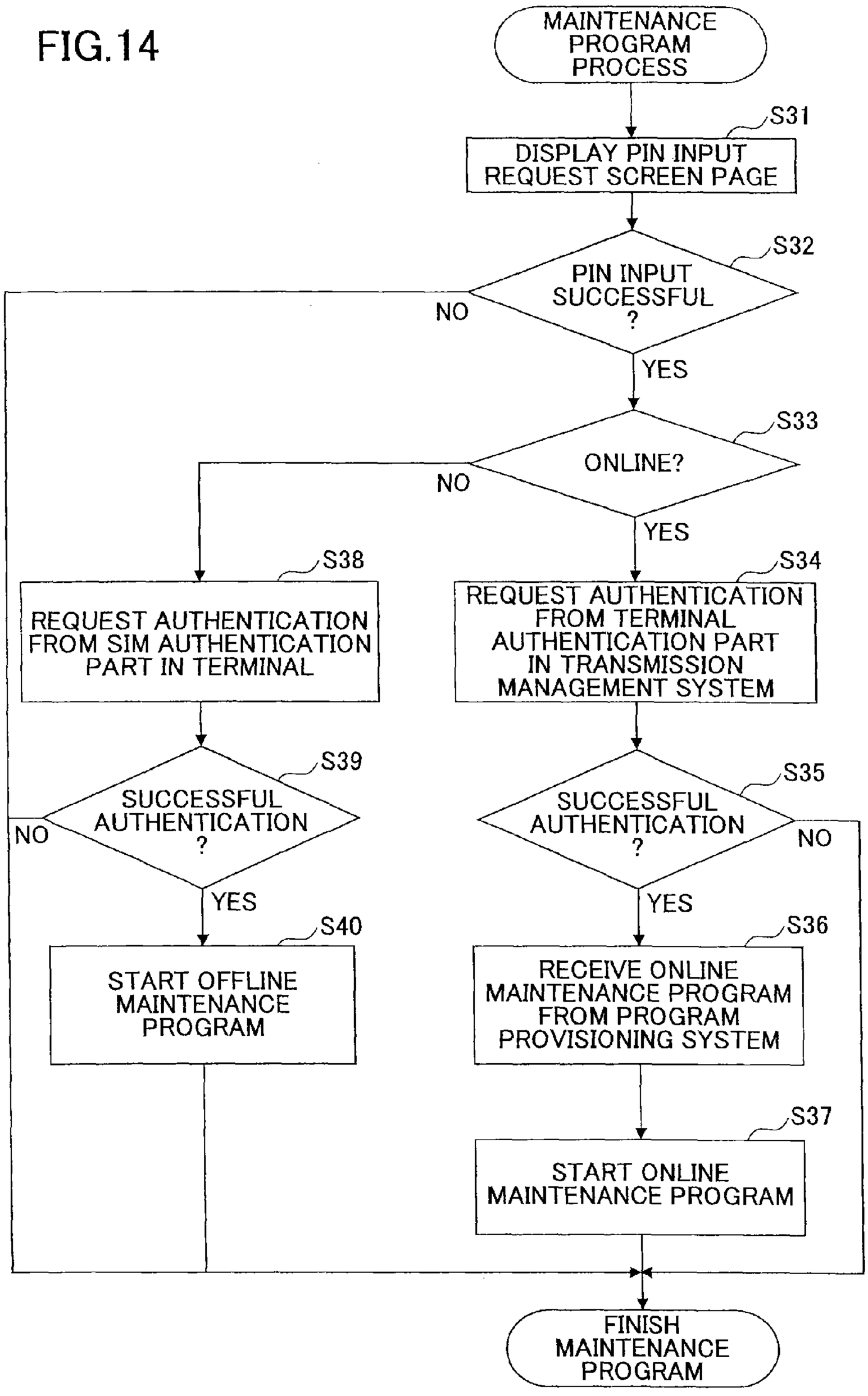

MAINTENANCE PROGRAM PROCESS
S31
DISPLAY PIN INPUT REQUEST SCREEN PAGE
S32
PIN INPUT SUCCESSFUL ?
NO
YES
S33
ONLINE?
NO
YES
S38
REQUEST AUTHENTICATION FROM SIM AUTHENTICATION PART IN TERMINAL
S34
REQUEST AUTHENTICATION FROM TERMINAL AUTHENTICATION PART IN TRANSMISSION MANAGEMENT SYSTEM
S39
SUCCESSFUL AUTHENTICATION ?
NO
YES
S35
SUCCESSFUL AUTHENTICATION ?
NO
YES
S40
START OFFLINE MAINTENANCE PROGRAM
S36
RECEIVE ONLINE MAINTENANCE PROGRAM FROM PROGRAM PROVISIONING SYSTEM
S37
START ONLINE MAINTENANCE PROGRAM
FINISH MAINTENANCE PROGRAM

FIG.15

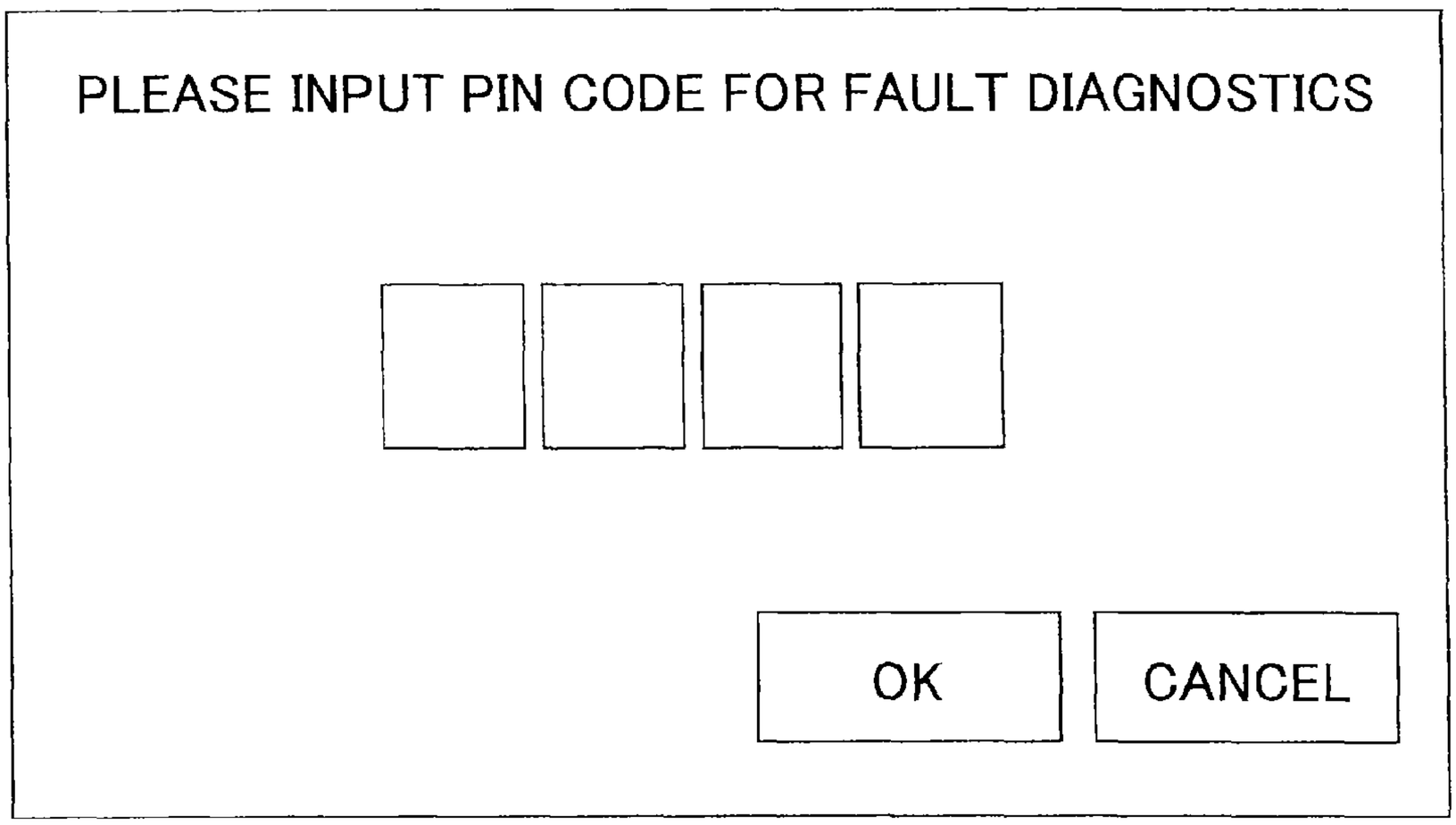


FIG.16

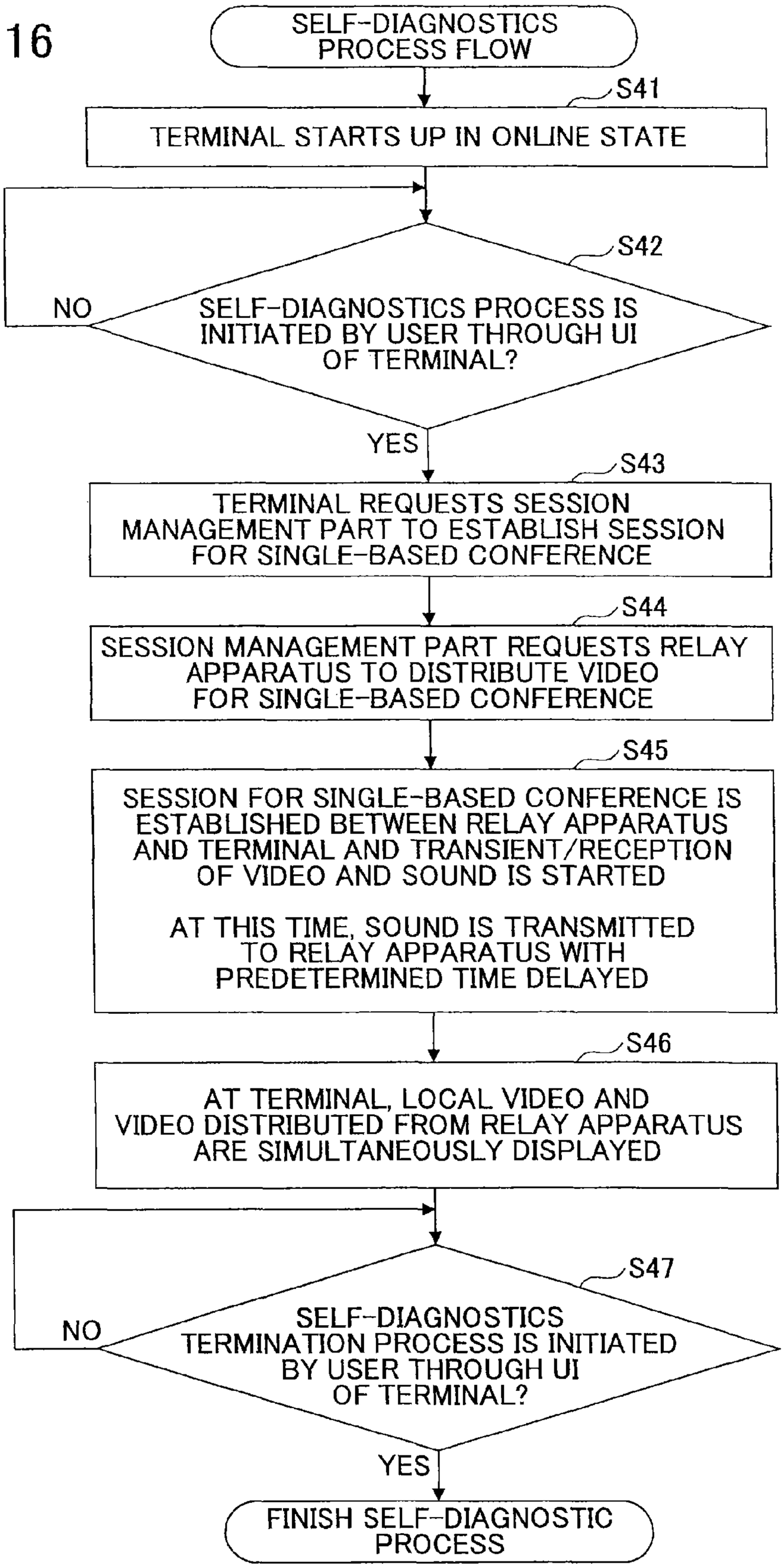

SELF-DIAGNOSTICS PROCESS FLOW
S41
TERMINAL STARTS UP IN ONLINE STATE
S42
NO
SELF-DIAGNOSTICS PROCESS IS INITIATED BY USER THROUGH UI OF TERMINAL?
YES
S43
TERMINAL REQUESTS SESSION MANAGEMENT PART TO ESTABLISH SESSION FOR SINGLE-BASED CONFERENCE
S44
SESSION MANAGEMENT PART REQUESTS RELAY APPARATUS TO DISTRIBUTE VIDEO FOR SINGLE-BASED CONFERENCE
S45
SESSION FOR SINGLE-BASED CONFERENCE IS ESTABLISHED BETWEEN RELAY APPARATUS AND TERMINAL AND TRANSIENT/RECEPTION OF VIDEO AND SOUND IS STARTED
AT THIS TIME, SOUND IS TRANSMITTED TO RELAY APPARATUS WITH PREDETERMINED TIME DELAYED
S46
AT TERMINAL, LOCAL VIDEO AND VIDEO DISTRIBUTED FROM RELAY APPARATUS ARE SIMULTANEOUSLY DISPLAYED
S47
NO
SELF-DIAGNOSTICS TERMINATION PROCESS IS INITIATED BY USER THROUGH UI OF TERMINAL?
YES
FINISH SELF-DIAGNOSTIC PROCESS

FIG.17

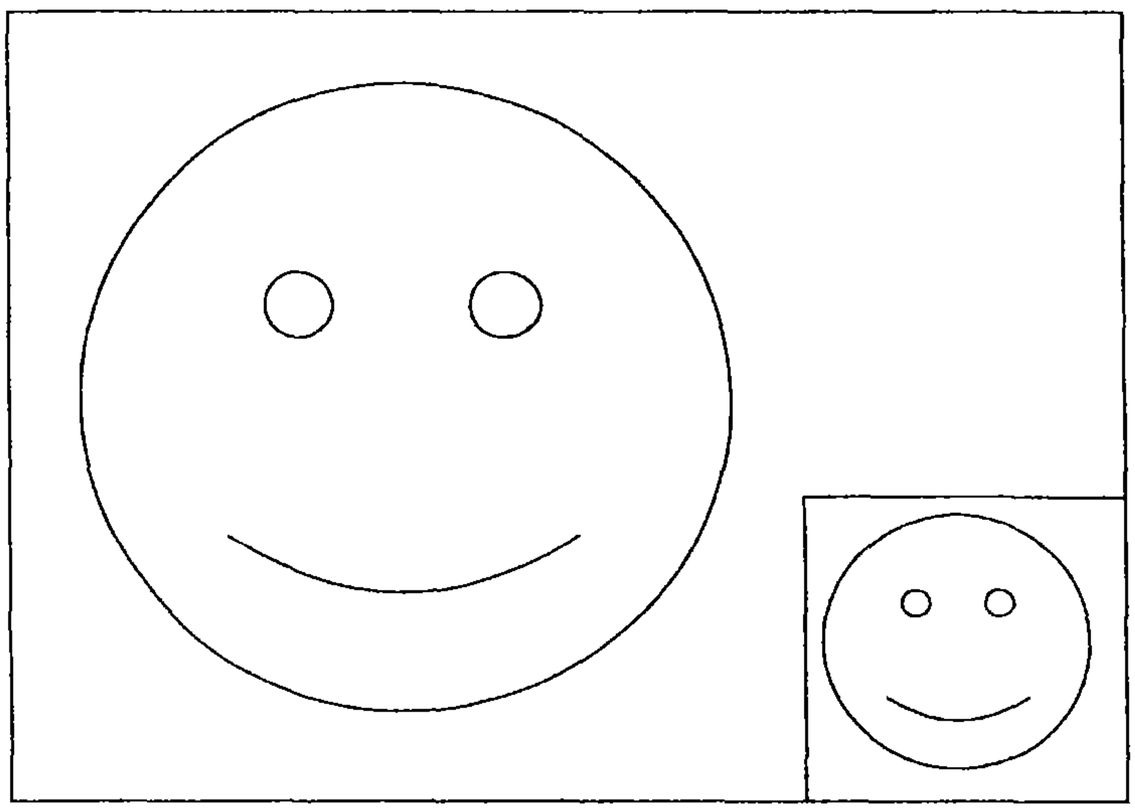
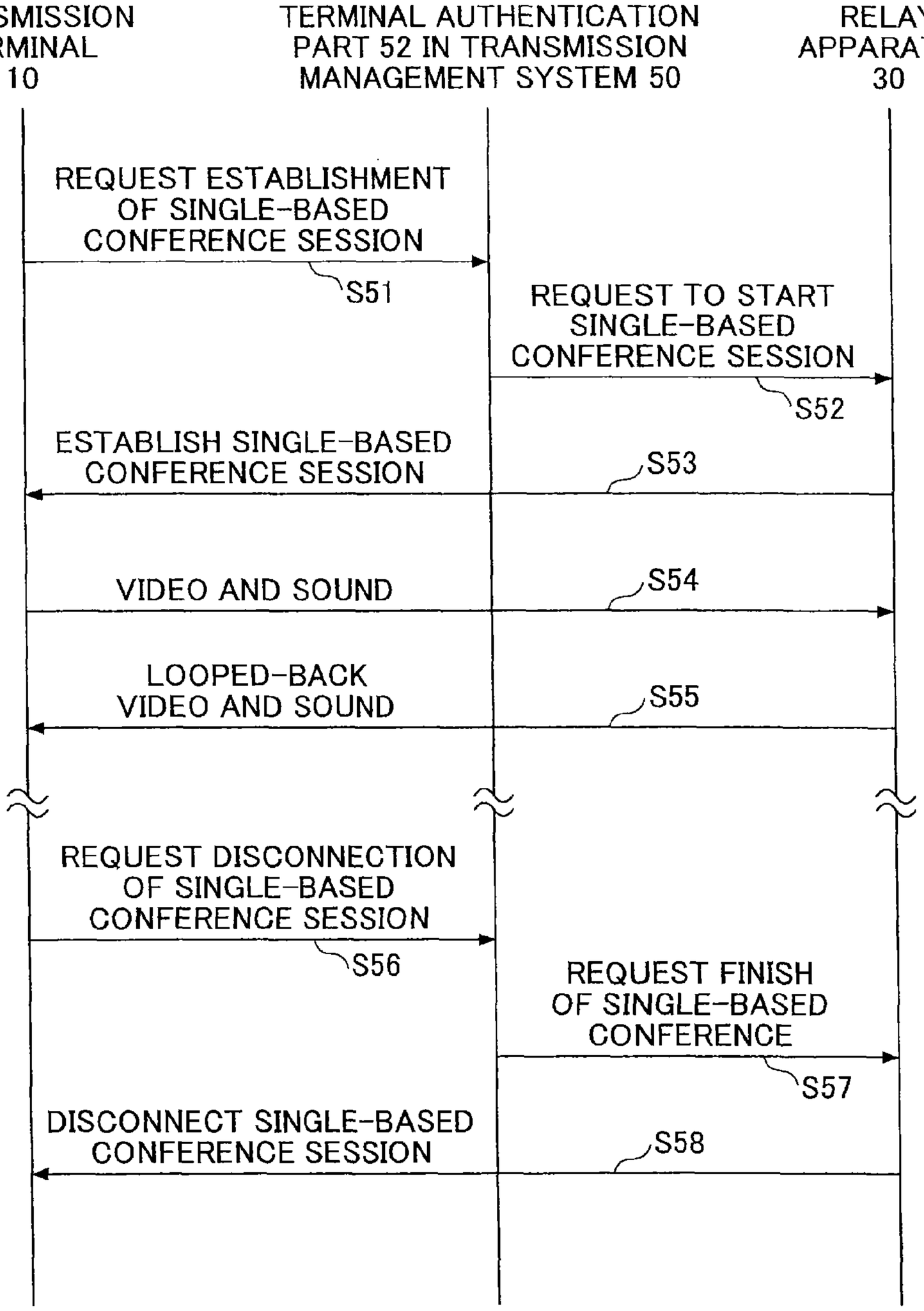


FIG.18


TRANSMISSION TERMINAL 10
TERMINAL AUTHENTICATION PART 52 IN TRANSMISSION MANAGEMENT SYSTEM 50
RELAY APPARATUS 30
REQUEST ESTABLISHMENT OF SINGLE-BASED CONFERENCE SESSION
S51
REQUEST TO START SINGLE-BASED CONFERENCE SESSION
S52
ESTABLISH SINGLE-BASED CONFERENCE SESSION
S53
VIDEO AND SOUND
S54
LOOPED-BACK VIDEO AND SOUND
S55
REQUEST DISCONNECTION OF SINGLE-BASED CONFERENCE SESSION
S56
REQUEST FINISH OF SINGLE-BASED CONFERENCE
S57
DISCONNECT SINGLE-BASED CONFERENCE SESSION
S58

TRANSMISSION SYSTEM, TRANSMISSION TERMINAL AND METHOD OF TRANSMITTING PROGRAM

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a transmission system, a transmission terminal and a method of transmitting a program.

2. Description of the Related Art

A remote conference system is known as one style of a transmission system connected with a network.

In such a remote conference system, a video distribution server distributes video data and sound data to respective transmission terminals.

SUMMARY OF THE INVENTION

According to one aspect of the present invention, a transmission system includes a transmission terminal that transmits content data to another transmission terminal via a network; a transmission management system that processes a session among a plurality of the transmission terminals or for the single transmission terminal and includes one or more information processing apparatuses; and a program providing apparatus that transmits a program to the transmission terminal. The transmission terminal includes an input request part that requests a user to input execution authentication information when an authentication medium is connected with the transmission terminal. The authentication medium includes a storage part that associates program identification information for identifying a program with the execution authentication information requested when the program is to be executed and stores them. The transmission terminal further includes an execution authentication information determination part that determines whether the execution authentication information that is input by the user is coincident with the execution authentication information stored in the storage part and a first transmission part that, when it is determined that the execution authentication information that is input by the user is coincident with the execution authentication information stored in the storage part, transmits the program identification information associated with the execution authentication information to the transmission management system. The transmission management system includes a second transmission part that transmits a transmission instruction to the program providing apparatus. The transmission instruction requests the program providing apparatus to transmit the program corresponding to the program identification information received from the transmission terminal to the transmission terminal. The program providing apparatus includes a third transmission part that, when receiving the transmission instruction, transmits the program corresponding to the program identification information received from the transmission management system to the transmission terminal.

Other objects, features and advantages of the present invention will become more apparent from the following detailed description when read in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** shows a configuration example of a transmission system;

FIG. **2** shows a hardware configuration example of a transmission terminal;

FIG. **3** shows a functional configuration example of main apparatuses;

FIG. **4** shows a conceptual diagram of a relay apparatus management table;

FIG. **5** shows a conceptual diagram of a terminal authentication management table;

FIG. **6** shows a conceptual diagram of a terminal management table;

FIG. **7** shows a conceptual diagram of a destination management table;

FIG. **8** shows a conceptual diagram of a session management table;

FIG. **9** shows a configuration example of a program provisioning system;

FIG. **10** shows a conceptual diagram of a program management table;

FIG. **11** is a flowchart showing a process example to select a maintenance program;

FIG. **12** shows one example of a maintenance program selection screen page;

FIG. **13** is a sequence diagram showing an example of an authentication process using a SIM card;

FIG. **14** is a flowchart showing a process example for the maintenance program;

FIG. **15** shows one example of a PIN code input screen page;

FIG. **16** is a flowchart showing one example a self-diagnostic process according to the maintenance program;

FIG. **17** shows a screen page example at a time of a self-diagnostic process; and

FIG. **18** is sequence diagram showing a process example of establishing a session for a self-diagnostic process and looping video and sound back.

DETAILED DESCRIPTION OF THE EMBODIMENTS

Below, using the drawings, the embodiment of the present invention will be described in detail.

<Configuration>

FIG. **1** shows a configuration example of a transmission system.

In FIG. **1**, the transmission system **1** includes a plurality of transmission terminals **10***aa*, **10***ab*, . . . (generalized as those "**10**"), display devices **120***aa*, **120***ab*, . . . (generalized as those "**130**") for the respective transmission terminals **10**, a plurality of relay apparatuses **30***a*, **30***b*, **30***c* and **30***d* (generalized as those "**30**"), a transmission management system **50**, a program provisioning system **90** and a maintenance system **100**.

The transmission system **1** can be, for example, a data providing system in which, via the transmission management system **50**, content data is transmitted from one transmission terminal **10** to another transmission terminal **10** in one direction; or a communication system in which, via the transmission management system **50**, information and/or feelings are transmitted among a plurality of transmission terminals **10**. The communication system is a system in which a plurality of communication terminals (corresponding to the transmission terminals **10**) transmit information and/or feelings thereamong via a communication management system (corresponding to the transmission management system **50**). A TV conference system, a TV telephone system, a voice conference system, a voice telephone system, a Personal Computer (PC) screen sharing system and so forth can be cited as examples of such a communication system.

Concerning the present embodiment, the transmission system **1**, the transmission management system **50** and the trans-

mission terminals **10** will be described assuming a TV conference system as one example of the communication system, assuming a TV conference management system as one example of a communication management system and assuming TV conference terminals as one example of communication terminals. In other words, the transmission terminals **10** and the transmission management system **50** according to the present invention can be applied not only to a TV conference system but also to a communication system or a transmission system.

The transmission terminal **10** transmits and receives image data and sound data as one example of content data. Note that it is also possible that instead of transmitting and receiving image data but the transmission terminal **10** transmits and receives sound data. Note that although a case will be described where image data is data of a moving picture, image data cannot only be a moving picture but also be a static picture. Further, image data can include data of a moving picture and a data of a static picture.

The relay apparatus **30** relays image data and sound data among a plurality of transmission terminals **10**. The transmission management system **50** manages the transmission terminals **10** and the relay apparatuses **30** unitarily.

The transmission system **1** can transmit and receive video data by using a video coding standard such as H.264/Scalable Video Coding (SVC). Further, a transmission management session is established through the transmission management system **50** for transmitting and receiving various sorts of management information. Then, video data and sound data are transmitted and received among the respective transmission terminal **10** via the relay apparatus(es). As a video coding standard, any of the known standards can be used, and is not limited to H.264/SVC. For example, H.264/Advanced Video Coding (AVC) can be used instead.

The program provisioning system **90** includes a storage device such as a Hard Disk (HD) and stores therein a program for a terminal which causes the transmission terminal **10** to implement various functions (or causes the transmission terminal to function as various units). The program provisioning system **90** can transmit the program for a terminal to each transmission terminal **10**. Further, the program provisioning system **90** also stores a program for a relay apparatus for causing the relay apparatus to implement various functions (or function as various units) and can transmits the program for a relay apparatus to each relay apparatus **30**. Further, the program provisioning system **90** stores also a maintenance program for the transmission terminal **10** and can transmit the program to the transmission terminal **10**.

FIG. **2** shows a hardware configuration example of the transmission terminal **10**.

The transmission terminal **10** includes a Central Processing Unit (CPU) **101** that controls the entirety of the transmission terminal **10**, a Read-Only Memory (ROM) **102** storing programs for driving the CPU **101** such as an Initial Program Loader (IPL), a Random Access Memory (RAM) **103** used as a work area for the CPU **101**, a flash memory **104** storing various sorts of data such as the program for a terminal, video data and sound data and a Solid State Drive (SSD) **105** that controls, under the control of the CPU **101**, reading and writing of various sorts of data on the flash memory **104**.

Further, the transmission terminal **10** includes a medium drive **107** that controls reading and writing of data on a recording medium **106** such as a flash memory, a Subscriber Identity Module (SIM) slot **131** for accessing a SIM card **130** as the authentication medium that stores authentication information and so forth and an IC card reading InterFace (I/F) **133** for reading information from an IC card **132**.

Further, the transmission terminal **10** includes operation buttons **108** operated by a user for selecting a destination of the transmission terminal **10**, a power switch **109** for turning on and off the power in the transmission terminal **10** and a network I/F **111** for transmitting data by using a communication network **2**.

Further, the transmission terminal **10** includes an built-in-type camera **112** that images a subject under the control of the CPU **101** and obtains video data, an image sensor I/F **113** that controls driving of the camera **112**, a microphone **114** for inputting sound, a built-in-type speaker **115** outputting sound and a sound input/output I/F **116** processing operations of inputting and outputting a sound signal under the control of the CPU **101** between the microphone **114** and the speaker **115**. The camera **112** includes a lens and a solid-state image sensor that converts light into electric charge and obtains electronic image data from a video image of a subject. As the solid-state image sensor, a Complementary Metal Oxide Semiconductor (CMOS) device, a Charge Coupled Device (CCD) or the like can be used.

The transmission terminal **10** further includes a display I/F **117** for transmitting video data to a display device **120** provided externally which is under the control of the CPU **101**. The display device **120** includes a liquid crystal device or an organic ElectroLuminescense (EL) for displaying a video image of a subject, an operation icon and so forth. The display device **120** is connected to the display I/F **117** via a cable **120***c*. The cable **120***c* can be a cable for an analog RGB (VGA) signal, a cable for component video or a cable for a High-Definition Multimedia Interface (HDMI) (registered trademark) signal or a Digital Video Interactive (DVI) signal.

Further, the transmission terminal **10** includes an external device connection I/F **118** for connecting various external devices, an alarm lamp **119** indicating faults in various functions of the transmission terminal **10** and a bus line **110** such as an address bus, a data bus, and so forth for electrically connecting the above-mentioned respective elements. To the external device connection I/F **118**, a camera to be provided externally, a microphone to be provided externally, a speaker to be provided externally or the like can be electrically connected via a Universal Serial Bus (USB) cable or the like. When a camera to be provided externally is connected, the camera to be provided externally is driven with priority to the built-in-type camera **112** under the control of the CPU **101**. In the same way, when a microphone to be provided externally or a speaker to be provided externally is connected, a microphone to be provided externally or a speaker to be provided externally is driven with priority to the built-in-type microphone **114** or the built-in type speaker **115**. To the external device connection I/F **118**, a SD card or a USB memory can be connected.

Note that the transmission terminal **10** can be a PC, a smartphone, a tablet terminal or a cellular phone/portable phone. Further, the transmission terminal **10** needs not include the camera, microphone and speaker provided internally, and can only include the camera, microphone and speaker provided externally.

FIG. **3** shows a functional configuration example of main apparatuses.

In FIG. **3**, the transmission terminal **10** includes a transmission and reception part **11**, an operation input reception part **12**, a login request part **13**, an imaging part **14**, a sound input part **15***a*, a sound output part **15***b*, a display control part **17**, a storage and reading process part **19**, an authentication information reading part **20** and a storage part **1000**. The storage part **1000** includes an offline authentication part **1001**.

The transmission and reception part **11** is implemented by the network I/F **111** shown in FIG. **2** and transmits and receives various sorts of data with another terminal, another apparatus or another system via the communication network **2**.

The operation input reception part **12** is implemented by the operation buttons **108** and the power switch **109** shown in FIG. **2** and receives various inputs from a user.

The login request part **13** is implemented by the CPU **101** shown in FIG. **2** and transmits, in response to the power being turned on, login request information requesting login and the current IP address of the transmission terminal **10** (the request source terminal) from the transmission and reception part **11** to the transmission management system **50** via the communication network **2** automatically. Note that it is also possible that the login request information is transmitted in response to, other than the power being turned on, a corresponding input given by a user to the operation input reception part **12** of the transmission terminal **10**.

The imaging part **14** is implemented by the camera **112** and the image sensor I/F **113** shown in FIG. **2**, takes an image of a subject using the camera **112** and outputs video data thus taken by the camera **112**.

The sound input part **15***a* is implemented by the microphone **114** and the sound input/output I/F **116** shown in FIG. **2**. When the microphone **114** converts a user's voice into a sound signal, sound data of the sound signal is input.

The sound output part **15***b* is implemented by the sound input/output I/F **116** and the speaker **115** shown in FIG. **2**. A sound signal of sound data is output to the speaker **115** which then outputs a corresponding sound.

The display control part **17** is implemented by the display I/F **117** shown in FIG. **2** and carries out control to transmit video data to the display device **120** provided externally.

The storage and reading process part **19** is implemented by the SSD **105** and so forth shown in FIG. **2**, stores various sorts of data in the storage part **1000** including the flash memory **104** or reads various sorts of data stored in the storage part **1000**.

The authentication information reading part **20** is implemented by the SIM slot **131**, the IC card reading I/F **133**, the external device connection I/F **118** and so forth shown in FIG. **2**, and reads information from the authentication medium **21**.

In the authentication medium **21**, a plurality of sets of authentication information for the transmission terminal **10** to carry out authentication and Personal Identification Number (PIN) codes as execution authentication information to be used for authentication when the maintenance program corresponding to the set of authentication information is executed are stored. Accessing the authentication medium **21** is allowed only through the authentication information reading part **20**. It is possible to start the respective maintenance programs corresponding to the plurality of sets of authentication information by using the plurality of sets of authentication information. The transmission terminal **10** uses information stored in the authentication medium **21** and requests, via the network, the transmission management system **50** to carry out authentication of the transmission terminal **10** and provide the corresponding maintenance program. The PIN codes are one example, and image information can be used instead.

The authentication information (the plurality of sets of authentication information) includes identification information and passwords indicating identification information of the transmission terminals managed by the transmission management system **50**. Further, program identification information for identifying each maintenance program to be executed is also included. Note that, instead of the identification information of the transmission terminals, user identification information can be used. Note that if the authentication medium **21** is lost, it is possible to remotely invalidate the authentication medium **21** by deleting the corresponding authentication information from a terminal authentication management DataBase (DB) **5002** in the transmission management system **50**.

The offline authentication part **1001** carries out terminal authentication using authentication information stored in the authentication medium **21** when the transmission terminal **10** is not connected to the communication network **2**. When the transmission terminal **10** is connected with the communication network **2**, the transmission terminal **10** uses information stored in the authentication medium **21** and carries out authentication of the transmission terminal **10** through the transmission management system **50** via the communication network **2**. In this case, in the transmission management system **50**, a terminal authentication part **52** described later uses a terminal authentication management DB **5002** to carry out terminal authentication. The offline authentication part **1001** has the same function as the terminal authentication part **52** in the transmission management system **50**.

The transmission management system **50** includes a transmission and reception part **51**, the terminal authentication part **52**, a state management part **53**, a terminal extraction part **54**, a terminal state obtaining part **55**, a session management part **57**, a storage and reading process part **59** and a storage part **5000**. In the storage part **5000**, a relay apparatus management DB **5001**, the terminal authentication management DB **5002**, a terminal management DB **5003**, a destination list management DB **5004** and a session management DB **5005** are provided.

(Relay Apparatus Management Table)

In the storage part **5000**, the relay apparatus management DB **5001** is provided which provides a relay apparatus management table such as that shown in FIG. **4**. The operation state of the relay apparatus, a received date and time when state information indicating the operation state is received by the transmission management system **50**, the IP address of the relay apparatus and the highest data transmission rate (Mbps) in the relay apparatus are associated with each other and stored in the relay apparatus management table for the relay apparatus ID of each relay apparatus. For example, in the relay apparatus management table shown in FIG. **4**, it is shown that the relay apparatus having the relay apparatus ID "**111***a*" has the operation state "online", the transmission management system **50** received the state information at "13:00, Nov. 10, 2009", the IP address of the relay apparatus is "1.2.1.2" and the highest data transmission rate in the relay apparatus is 100 Mbps.

(Terminal Authentication Management Table)

Further, in the storage part **5000**, the terminal authentication management DB **5002** is provided which includes a terminal authentication management table such as that shown in FIG. **5**. In the terminal authentication management table, passwords are associated with the respective terminal IDs of all the transmission terminals **10** managed by the transmission management system **50** and are managed. For example, in the terminal authentication management table shown in FIG. **5**, it is shown that the terminal ID of the transmission terminal **10***aa* is "**01***aa*" and the password is "aaaa".

(Terminal Management Table)

Further, in the storage part **5000**, the terminal management DB **5003** is provided which includes a terminal management table shown in FIG. **6**. In the terminal management table, the operation state of the transmission terminal **10**, a date and

time when login request information described later is received by the transmission management system **50** and the IP address of the transmission terminal **10** are associated with the terminal ID of each transmission terminal **10** and are managed. For example, in the terminal management table shown in FIG. **6**, it is shown that the transmission terminal **10***aa* having the terminal ID "**01***aa*" has the operation state "online", the transmission management system **50** received the login request information at "13:40, Nov. 10, 2009" and the transmission terminal **10***aa* has the IP address "1.2.1.3".

(Destination List Management Table)

Further, in the storage part **5000**, the destination list management DB **5004** is provided which includes a destination list management table shown in FIG. **7**. In the destination list management table, the terminal IDs of all the transmission terminals registered as candidates for a destination terminal **10**B are associated with the terminal ID of each of request source terminals **10**A which requests a start of a TV conferences and are managed. For example, in the destination list management table shown in FIG. **7**, it is shown that the candidates for a destination terminal **10**B for which a start of a TV conference is requested by the request source terminal **10***aa* having the terminal ID "**01***aa*" include three, i.e., the transmission terminal **10***ab* having the terminal ID "**01***ab*", the transmission terminal **10***ba* having the terminal ID "**01***ba*" and the transmission terminal **10***db* having the terminal ID "**01***db*". The candidates for a destination terminal **10**B are updated through an addition or a deletion by an addition or a deletion request from a request source terminal **10**A to the transmission management system **50**.

(Session Management Table)

Further, in the storage part **5000**, the session management DB **5005** is provided which includes a session management table such as that shown in FIG. **8**. In the session management table, the relay apparatus ID of the relay apparatus **30** to be used for relaying image data and sound data, the terminal ID of the request source terminal **10**A, the terminal ID of the destination terminal **10**B, a delay time (ms) for receiving image data at the destination terminal **10**B and a date and time when delay information indicating the delay time transmitted by the destination terminal **10**B is received by the transmission management system **50** are associated with each selection session ID to be used to carry out a session for selecting the relay apparatus **30** and are managed. For example, in the session management table shown in FIG. **8**, it is shown that the relay apparatus **30***a* (the relay apparatus ID "**111***a*") selected through a session carried out by using the selection session ID "sel" relays image data and sound data between the request source terminal **10***aa* having the terminal ID "**01***aa*" and the destination terminal **10***db* having the terminal ID "**01***db*" and the delay time of image data at a time of "14:00, Nov. 10, 2009" at the destination terminal **10***db* is 200 (ms). Note that when a TV conference is held between two transmission terminals **10**, it is also possible to manage a date and time when the delay information is received based on the delay information transmitted not from the destination terminal **10**B mentioned above but from the request source terminal **10**A. However, when a TV conference is held among three or more transmission terminals **10**, a date and time when the delay information is received is managed based on the delay information transmitted from the transmission terminal at the reception end of image data and sound data.

The transmission and reception part **51** transmits and receives various data (or information) to and from another transmission terminal or the transmission management system **50** via the communication network **2**.

The terminal authentication part **52** carries out terminal authentication by searching the terminal authentication management DB **5002** in the storage part **5000** using, as search keys, the terminal ID and password included in login request information received through the transmission and reception part **51** and determining whether the same terminal ID and password are managed in the terminal authentication management table. Note that it is also possible to use a more complicated authentication method instead of the authentication method using a password.

In order to manage the operation state of the request source terminal which sends a login request, the state management part **53** associates the terminal ID of the request source terminal, the operation state of the request source terminal, a date and time when the transmission management system **50** receives the login request information and the IP address of the request source terminal with each other, stores them in the terminal management table of the terminal management DB **5003** and manages them.

The terminal extraction part **54** extracts the terminal ID by reading the terminal ID of the candidate for a destination terminal which can carry out a telephone call with the request source terminal by searching the destination list management table of the destination list management DB **5004** using, as a search key, the terminal ID of the request source terminal which sends the login request.

The terminal state obtaining part **55** reads the operation state of the terminal ID extracted by the terminal extraction part **54** by searching the terminal management table of the terminal management DB **5003** by using, as a search key, the terminal ID of the candidate for a destination terminal extracted by the terminal extraction part **54**.

The session management part **57** associates the session ID, the terminal ID of the request source terminal and the terminal ID of the destination terminal with each other, stores them in the session management table of the session management DB **5005** and manages them.

The storage and reading process part **59** stores various data in the storage part **5000** and reads various data stored in the storage part **5000**.

FIG. **9** shows a configuration example of the program provisioning system.

The program provisioning system **90** includes a program transmission instruction reception part **91**, a program determination part **92**, a program transmission part **93** and a storage part **9000**. In the storage part **9000**, a program management DB **9001** is stored.

The program management DB **9001** is a DB in which program identification information for identifying each program and address information at which the program is stored is associated with each other. FIG. **10** shows one example of the program management table included in the program management DB **9001**.

Returning to FIG. **9**, the program transmission instruction reception part **91** has a function of receiving a program transmission instruction from the transmission management system **50**. The program determination part **92** has a function of determining the address information of the corresponding program from the program management DB **9001** based on the program identification information included in the received program transmission instruction. The program transmission part **93** has a function of transmitting the program obtained based on the determined address information of the program to the address information of the transmission terminal **10** included in the program transmission instruction.

<Operations>

FIG. **11** is a flowchart showing a process example to select the maintenance program. Note that, below, a case will be described where, as one example of the authentication medium **21**, a SIM card **130** is used. However, it is also possible to use an IC card, a SD card, a USB memory or the like as the authentication medium **21**.

In FIG. **11**, a user or a serviceman starts the transmission terminal **10** (step S**1**). At this time, a general user inserts a SIM card **130** for a general user into the transmission terminal **10** and starts the transmission terminal **10**. On the other hand, a serviceman inserts a SIM card **130** for maintenance into the transmission terminal **10** and starts the transmission terminal **10**. As for a method of managing the SIM cards **130** for maintenance, they are strictly managed as a result of, for example, only servicemen who previously obtain permission therefor being allowed to have the SIM cards **130**.

The transmission terminal **10** determines the type of the inserted SIM card **130** by using SIM card type information stored in the inserted SIM card **130** (step S**2**). The SIM card type information includes identification information for determining whether the SIM card **130** is one for a general user or one for maintenance. Note that it is also possible that, when the SIM card type information indicates the type of a maintenance card, the transmission terminal **10** determines it as one for maintenance, whereas, when no SIM card type information is stored in the SIM card **130**, the transmission terminal **10** determines it as one for a general user.

When the type of the SIM card **130** is one for maintenance ("FOR MAINTENANCE" in step S**2**) as a result of the determination in step S**2**, the transmission terminal **10** displays a maintenance program selection screen page (step S**3**).

FIG. **12** shows one example of the maintenance program selection screen page. In the example, 6 types of maintenance programs (functions) can be selected. Functions displayed here can be changed according to the state of connection of the transmission terminal **10** with the communication network 2. For example, a firmware update function having a relatively large size may require a wired LAN environment instead of a wireless LAN environment since a considerable time may be required for downloading it. As for such a firmware update function, it is also possible that the transmission terminal **10** determines whether the currently connected network corresponds to a wired LAN environment and displays the maintenance program selection screen page only when the currently connected network corresponds to a wired LAN environment.

Returning to FIG. **11**, when the serviceman selects a maintenance program, a process concerning the selected maintenance program is carried out (steps S**4** to S**6**). Note that the transmission terminal **10** requests the user to input a PIN code corresponding to the maintenance program via a Graphical User Interface (GUI). When a PIN code is input and the PIN code is an authorized one, the corresponding process is then carried out. Details of the process concerning such a maintenance program will be described later.

Further, the "maintenance program" is a program not necessary when a general user uses a remote conference function, and is a program whose operations cannot be guaranteed if a general user operates it, such as a function of updating the firmware or BIOS, a function of obtaining network communication quality concerning communication with the transmission management system **50**, a function of changing a non-compatible device to a compatible device, a function of tuning for a specific user or the like.

Usage of these maintenance programs can be limited depending on the skill of a serviceman. For the respective maintenance programs, PIN codes are assigned for allowing the corresponding maintenance program to be used. A method of managing the PIN codes is, for example, such that all the PIN codes are disclosed to a serviceman who is highly skilled in Information Technology (IT) and has received the proper security training. On the other hand, only predetermined PIN codes are disclosed to a serviceman who receives minimal training.

On the other hand, when the type of the SIM card **130** is one for a general user ("FOR GENERAL USER" in step S**2**) as a result of the determination in step S**2**, the transmission terminal **10** determines whether the transmission terminal **10** is in an online state capable of being able to connect to the communication network **2** (step S**7**).

When it is determined that the transmission terminal **10** is in an online state (YES in step S**7**), the transmission terminal **10** transmits login request information including the identification information and the password of the transmission terminal **10** to the transmission management system **50**. In the transmission management system **50**, the terminal authentication part **52** authenticates the transmission terminal **10** by using the identification information and the password included in the login information received from the transmission terminal **10** and the information stored in the terminal authentication management DB. Then, when the transmission terminal **10** receives an authentication result indicating that the authentication is successful from the transmission management system **50**, it is possible to start a program in a mode to be used by a general user (step S**8**). That is, a program for a normal conference terminal is transmitted to the transmission terminal **10** and is started. Then, from its menu, the user can use the online maintenance program (usable online) for a general user.

On the other hand, when the transmission terminal **10** is in an offline state of not being able to be connected with the communication network **2** (NO in step S**7**), a program for a conference terminal for offline is started in the transmission terminal **10**. The offline maintenance program (usable offline) for a general user can be used through its menu (step S**9**). Note that, with the offline maintenance program, in comparison to the online maintenance program, a function that can be used only online, for example, a function of diagnostics to determine whether a network can be connected between the transmission terminal **10** and the relay apparatus **30** cannot be used. Thus, a function that can be used only online cannot be used with the offline maintenance program. Further, in an offline state, the transmission management system **50** cannot authenticate the transmission terminal **10**. Therefore, it is possible to provide such a configuration that a function that can be used offline but requires a high security level cannot be used with the offline maintenance program.

In the related art, only a User Interface (UI) or setting information is obtained from a server through authentication, and therewith, an operation setting or a UI of a transmission terminal is changed. However, in this method, a program for a maintenance process itself is stored in the transmission terminal. Therefore, information for maintenance may be found out when an analysis such as disassembling is carried out on a disk or the like that is removed from the transmission terminal. In order to avoid such a situation, the disk or the like should be encrypted.

In contrast thereto, according to the present embodiment, the process program itself is placed in a server (cloud) or is stored in a recording medium (such as a SD card type SIM card or the like) for authentication. Then, when authentication is successful, the maintenance program is transmitted to the

transmission terminal and is executed. Thereby, it is possible to provide the maintenance function safely.

In a case where it is not possible to connect with a network, the process program is stored in an "authentication card for maintenance" which requires authentication for executing the stored program. Then, a serviceman uses the "authentication card for maintenance", as an authentication card and also as a maintenance program storage card. Thereby, it is possible to safely provide the maintenance function.

Further, according to the present embodiment, it is possible to provide a plurality of maintenance functions by a single SIM card as a result of different sets of authentication information being stored for the respective functions in the single SIM card and also a program being stored which requests the user to input a corresponding set of authentication information for each of the different services. In other words, it is possible to provide maintenance services to respective servicemen having different skills from a single SIM card.

FIG. **13** is a sequence diagram showing an example of an authentication process using a SIM card.

In FIG. **13**, in a case of being online, when a serviceman selects, for example, a maintenance program #**1** on the transmission terminal **10** (step S**11**) and inputs a corresponding PIN code #**1**, the PIN code #**1** is provided to the SIM card **130** (step S**12**).

When the provided PIN code is coincident with a previously set one in the SIM card **130**, authentication information #**1** in the SIM card **130** including the identification information and the password of the transmission terminal and the program identification information of the maintenance program corresponding to the PIN code is transmitted to the transmission management system **50** (step S**13**). In the transmission management system **50**, the terminal authentication part **52** carries out authentication by determining whether the identification information and the password of the transmission terminal included in the received authentication information #**1** are coincident with information in the terminal authentication management DB. When it is determined as being coincident (it is determined that the authentication is successful), a transmission instruction is transmitted to the program provisioning system **90** to transmit the maintenance program corresponding to the program identification information included in the authentication information #**1** to the transmission terminal **10** (step S**14**). Note that the transmission instruction includes not only the program identification information but also the address information (such as an IP address) for determining the place of the transmission terminal **10**. The IP address of the transmission terminal **10** can be determined by reading the terminal management DB.

In response thereto, the program provisioning system **90** transmits a maintenance program #**1** usable online corresponding to the program identification information to the transmission terminal **10** according to the received address information (step S**15**).

Next, when the serviceman selects, for example, a maintenance program #**2** (step S**16**) and inputs a corresponding PIN code #**2** on the transmission terminal **10**, the PIN code #**2** is provided to the SIM card **130** (step S**17**).

When the provided PIN code is coincident with one that is previously set in the SIM card **130**, authentication information #**2** in the SIM card **130** including the identification information and the password of the transmission terminal and the program identification information of the maintenance program corresponding to the PIN code is transmitted to the transmission management system **50** (step S**18**). In the transmission management system **50**, the terminal authentication part **52** carries out authentication by determining whether the identification information and the password of the transmission terminal included in the received authentication information #**2** are coincident with information in the terminal authentication management DB. When it is determined as being coincident (when the authentication is successful), a transmission instruction is transmitted to the program provisioning system **90** to transmit the maintenance program corresponding to the program identification information included in the authentication #**2** to the transmission terminal **10** (step S**19**). Note that, the transmission instruction includes not only the program identification information but also the address information (such as an IP address) for determining the place of the transmission terminal **10**. The IP address of the transmission terminal **10** can be determined by reading the terminal management DB.

In response thereto, the program provisioning system **90** transmits a maintenance program #**2** corresponding to the program identification information usable online to the transmission terminal **10** based on the received address information (step S**20**).

On the other hand, in a case of being offline, when the serviceman selects, for example, the maintenance program #**1** on the transmission terminal **10** (step S**21**) and inputs the corresponding PIN code #**1**, the PIN code #**1** is provided to the SIM card **130** (step S**22**).

When the provided PIN code is coincident with one that is previously set in the SIM card **130**, the authentication #**1** in the SIM card **130** is transmitted to the offline authentication part **1001** in the transmission terminal **10** (step S**23**). When authentication in the offline authentication part **1001** is successful, a response indicating that the authentication of the authentication #**1** is successful is provided (step S**24**).

In response thereto, the transmission terminal **10** starts a maintenance program #**1** usable offline (step S**25**).

FIG. **14** is a flowchart showing a process example for the maintenance program.

In FIG. **14**, when the maintenance program is selected and started, the PIN code input screen page corresponding to the selected maintenance program is displayed (step S**31**). FIG. **15** shows one example of the PIN code input screen page. For example, when a PIN code having four digits is input and an OK button is pressed on the PIN code input screen page, the input is completed.

Note that it is possible that the input of the PIN code is carried out using a keyboard which can be connected to the transmission terminal **10**.

Further, the PIN code does not need to be a numeral or characters. Such an input of a numeral or characters using the keyboard requires the keyboard to be carried. On the other hand, a predetermined combination of a plurality of keys of the transmission terminal **10** can be stored as the PIN code. In this case, when a user turns on the power in the transmission while pressing the predetermined combination of the plurality of keys on the transmission terminal **10**, the terminal regards this operation as the PIN code of the plurality of keys being input. Then, the transmission terminal **10** compares the thus input PIN code (the predetermined combination of the plurality of keys with a stored PIN code (also a predetermined combination of a plurality of keys). Then, when both are coincident with each other, the transmission terminal **10** cancels the usage restriction of the maintenance program. Alternatively, it is also possible that when a user presses predetermined keys on the transmission terminal **10** in an arbitrary order immediately after selecting the maintenance program, the transmission terminal **10** regards the information of the

pressed predetermined keys as the PIN code and determines whether the thus input PIN code is coincident with a stored one in the same way.

Returning to FIG. **14**, when the PIN code input is successful (PASS) (YES in step S**32**), it is determined whether the current state of the transmission terminal **10** is online or offline (step S**33**). Whether online or offline can be determined based on the network connection state of the transmission terminal **10**.

When the transmission terminal **10** is online (YES in step S**33**), the transmission terminal **10** requests the terminal authentication part **52** in the transmission management system **50** to carry out authentication (step S**34**). When the authentication is successful (YES in step S**35**), the transmission terminal **10** receives an online maintenance program (usable online) from the program provisioning system **90** (step S**36**) and starts the received online maintenance program (step S**37**).

On the other hand, in a case of being offline (NO in step S**33**), the offline authentication part **1001** in the transmission terminal **10** is requested to carry out authentication (step S**38**). When the authentication is successful (YES in step S**39**), an offline maintenance program (usable offline) is started (step S**40**).

The offline maintenance program has such a function of being able to be executed at an authentication level less than the online maintenance program. Further, depending on the maintenance program, the program is be finished in a case of being offline while indicating that there is no valid function.

FIG. **16** is a flowchart showing one example a self-diagnostic process according to the maintenance program. Note that this process flow is one example a flow of a process carried out according to a maintenance program and is a flow of a process after the maintenance program is started in the flow shown in FIG. **14**. Further, a condition required for executing the maintenance program is that the transmission terminal **10** is started online.

In FIG. **16**, when the transmission terminal **10** is started online (step S**41**), the transmission terminal **10** waits until a user initiates a self-diagnostic process from a menu of a user interface (UI) in the transmission terminal **10** (step S**42**).

When the self-diagnostic process is thus initiated (YES in step S**42**), the transmission terminal **10** requests the session management part **57** in the transmission management system **50** to establish a session for a single-based conference (step S**43**). A "single-based conference" means creating a virtual conference room by a single transmission terminal **10** where the transmission terminal **10** connected by a session for a single-based conference has video and sound looped back and thus sent back. FIG. **17** shows a display example on the transmission terminal **10** at this time. In FIG. **17**, a local video is displayed in a bottom-right small area and a looped back video is displayed in another large area.

Returning to FIG. **16**, the session management part **57** in the transmission management system **50** requests the relay apparatus **30** to distribute a video for the single-based conference (step S**44**). Thereafter, the session for the single-based conference is established between the relay apparatus **30** and the transmission terminal **10** and transmission and reception of video and sound are started (step S**45**). At this time, video transmitted from the transmission terminal **10** is looped back and thus sent back in a real-time manner from the relay apparatus **30** while sound is once recorded in the transmission terminal **10** for being able to easily receive diagnostics. Thereafter, the once recorded sound is transmitted to the relay apparatus **30** after being delayed for, for example, around 3 seconds.

The transmission terminal **10** displays the local video (not through the relay apparatus) **30** and the video distributed by the relay apparatus **30** simultaneously. Also, the transmission terminal **10** outputs the sound from the speaker after the sound is input via the microphone and then is looped back from the relay apparatus **30** (step S**46**). Thereby, it is possible to carry out diagnostics of the functions of the camera, the microphone and the speaker only in the single transmission terminal **10**, and also, it is possible to determine whether there is any problem in the network between the transmission terminal **10** and the relay apparatus **30**.

Thereafter, when the user initiates a self-diagnostics termination process from the menu of the user interface in the transmission terminal **10** (YES in step S**47**), the transmission terminal **10** terminates the self-diagnostics.

FIG. **18** is a sequence diagram showing a process example of establishing the session for the self-diagnostic process and looping video and sound back.

In FIG. **18**, when the transmission terminal **10** requests the session management part **57** in the transmission management system **50** to establish a session for a single-based conference (step S**51**), the session management part **57** requests the relay apparatus **30** to starts a single-based conference (step S**52**) and the relay apparatus **30** notifies the transmission terminal **10** that the session for the single-based conference is established (step S**53**).

The transmission terminal **10** transmits video and sound to the relay apparatus **30** (step S**54**), the relay apparatus **30** loops them back and transmits them to the transmission terminal **10** (step S**55**).

Thereafter, when a disconnection of the session for the single-based conference is requested from the transmission terminal **10** to the session management part **57** in the transmission management system **50** (step S**56**), the session management part **57** requests the relay apparatus **30** to finish the single-based conference (step S**57**) and the relay apparatus **30** notifies the transmission terminal **10** that the session for the single-based conference is disconnected (step S**58**).

Generally speaking, in the related art, loop back is carried out inside a transmission terminal to check video and sound, or a switching unit provided before a switch board is used to carry out self-diagnostics. However, such a function described above according to the present embodiment considering a possible problem that may occur in a transmission route and/or a network band between a video distribution server and a transmission terminal has not been in the related art. According to the present embodiment, it is possible to carry out self-diagnostics also considering a possible influence by a transmission route.

<Summary of the Embodiment>

As described above, according to the present embodiment, concerning maintenance of a transmission terminal (**10**) included in a transmission system (**1**) such as a remote conference system, it is possible to provide a function(s) concerning a plurality of maintenance options having different security requirements, respectively, using an authentication medium such as a single SIM card while ensuring safety on security.

Thus, the transmission system, the transmission terminal and the method of transmitting a program have been described in the embodiment. However, the present invention is not limited to the specifically disclosed embodiment and variations and modifications may be made without departing from the scope of the present invention.

[Supplement to the Embodiment]

Note that, each of the relay apparatuses **30**, the transmission management system **50**, the program provisioning sys-

tem **90** and the maintenance system **100** according to the embodiment described above can be implemented by a single computer, or can be implemented by a plurality of computers to which the respective parts (functions or the like) thereof are divided and allocated. When the program provisioning system **90** is implemented by a single computer, a program transmitted by the program provisioning system **90** can be transmitted in such a manner that the program is transmitted in a form of a plurality of modules divided from the program or is transmitted without being thus divided. Further, when the program provisioning system **90** is implemented by a plurality of computers, a program can be transmitted from the respective computers in a state where the program is divided into a plurality of modules.

Further, a recording medium or recording media storing the program for the terminal, the program for the relay apparatus, the program for transmission management and the program for the transmission terminal management system, a hard disk(s) storing these programs, and the program provisioning system **90** including the hard disk(s) can be used as program products when the program for the terminal, the program for the relay apparatus, the program for transmission management and the program for the transmission terminal management system are provided to a user(s) in a country or outside of a country.

Further, the present embodiment has been described for a case where the TV conference system is one example of a transmission system **1**. However, the present invention is not limited thereto. The present invention can also be applied to a telephone system such as an Internet Protocol (IP) telephony system, an Internet telephony system or the like. Further, the transmission system **1** can be a car navigation system. In this case, for example, one transmission terminal **10** can is used as a car navigation apparatus mounted in a vehicle and another transmission terminal **10** can is used as a management terminal in a management center or a management server which manages the car navigation system, or a car navigation apparatus mounted in another vehicle.

Further, the transmission system **1** can be a communication system for cellar phones/portable phones. In this case, for example, the transmission terminals **10** correspond to cellular phones/portable phones.

Further, the present embodiment has been described where image data and sound data are one example of content data. However, content data is not limited thereto. For example, content data can be tactile data. In this case, a feeling of a user touching one transmission terminal is transmitted to another transmission terminal. Content data can also be smell data. In this case, a smell in one transmission terminal is transmitted to another transmission terminal. Further, content data can be at least one of image data, sound data, tactile data and smell data.

Further, the present embodiment has been described where the transmission system **1** is used for a TV conference. However, the present invention is not limited thereto. For example, the transmission system **1** can also be used for a meeting, a general conversation among family members or friends, or a submission of information unilaterally.

The present invention can be implemented in any convenient form, for example using dedicated hardware, or a mixture of dedicated hardware and software. The present invention may be implemented as computer software implemented by one or more networked processing apparatuses. The network can comprise any conventional terrestrial or wireless communications network, such as the Internet. The processing apparatuses can comprise any suitably programmed apparatuses such as a general purpose computer, personal digital assistant, mobile telephone (such as a WAP or 3G-compliant phone) and so on. Since the present invention can be implemented as software, each and every aspect of the present invention thus encompasses computer software implementable on a programmable device. The computer software can be provided to the programmable device using any storage medium for storing processor readable code such as a floppy disk, hard disk, CD ROM, magnetic tape device or solid state memory device.

As mentioned above, the hardware platform includes any desired type of hardware resources including, for example, a central processing unit (CPU), a random access memory (RAM), and a hard disk drive (HDD). The CPU may be implemented by any desired type of any desired number of processor. The RAM may be implemented by any desired type of volatile or non-volatile memory. The HDD may be implemented by any desired type of non-volatile memory capable of storing a large amount of data. The hardware resources may additionally include an input device, an output device, or a network device, depending on the type of the apparatus. Alternatively, the HDD may be provided outside of the apparatus as long as the HDD is accessible. In this example, the CPU, such as a cache memory of the CPU, and the RAM may function as a physical memory or a primary memory of the apparatus, while the HDD may function as a secondary memory of the apparatus.

The present application is based on and claims the benefit of priority of Japanese Priority Application No. 2013-129852, dated Jun. 20, 2013, the entire contents of which are hereby incorporated herein by reference.

PATENT REFERENCE

Patent Reference No. 1: Japanese Laid-Open Patent Application No. 2011-233031

Patent Reference No. 2: Japanese Laid-Open Patent Application No. 2004-303215

What is claimed is:

1. A transmission system comprising:

a transmission terminal that transmits content data to another transmission terminal via a network;

a transmission management system that processes a session among a plurality of the transmission terminals or for the single transmission terminal and includes one or more information processing apparatuses; and

a program providing apparatus that transmits a program to the transmission terminal, wherein

the transmission terminal includes circuitry that

requests a user to input execution authentication information when an authentication medium is connected with the transmission terminal, the authentication medium including a storage storing first program identification information identifying a first program and first execution authentication information indicating information requested to be input when the first program is executed in such a manner as to associate the first program identification information with the first execution authentication information, and storing second program identification information identifying a second program different from the first program and second execution authentication information indicating information requested to be input when the second program is executed in such a manner as to associate the second program identification information with the second execution authentication information,

determines whether the execution authentication information that is input by the user is coincident with the first execution authentication information or the second execution authentication information stored by the storage, and

transmits the first program identification information to the transmission management system when it is determined that the execution authentication information that is input by the user is coincident with the first execution authentication information, and transmits the second program identification information to the transmission management system when it is determined that the execution authentication information that is input by the user is coincident with the second execution authentication information.

the transmission management system includes circuitry that transmits, to the program providing apparatus, a transmission instruction to transmit the first program corresponding to the first program identification information to the transmission terminal, or transmits, to the program providing apparatus, a transmission instruction to transmit the second program corresponding to the second program identification information to the transmission, and

the program providing apparatus includes circuitry that transmits the first program corresponding to the first program identification information to the transmission terminal, or transmits the second program corresponding to the second program identification information to the transmission terminal.

2. The transmission system as claimed in claim **1**, wherein

a PIN code is stored in the authentication medium as the first execution authentication information for the first program identification information, and

the transmission terminal transmits the first program identification information to the transmission management system when a PIN code that is input is coincident with the stored PIN code.

3. The transmission system as claimed in claim **1**, wherein

the first execution authentication information is image information.

4. The transmission system as claimed in claim **2**, wherein

the circuitry of the transmission terminal regards information concerning keys that is input to the transmission terminal as the PIN code and carries out the determination.

5. The transmission system as claimed in claim **1**, wherein

the circuitry of the transmission terminal carries out authentication internally at the transmission terminal, when the transmission terminal is not connected with the network.

6. The transmission system as claimed in claim **1**, wherein

the transmission terminal limits usable functions to be displayed when being connected with a wireless network.

7. A transmission terminal which transmits content data to another transmission terminal via a network, the transmission terminal comprising:

circuitry that

requests a user to input execution authentication information when an authentication medium is connected with the transmission terminal, the authentication medium including a storage storing first program identification information identifying a first program and first execution authentication information indicating information requested to be input when the first program is executed in such a manner as to associate the first program identification information with the first execution authentication information, and storing second program identification information identifying a second program different from the first program and second execution authentication information indicating information requested to be input when the second program is executed in such a manner as to associate the second program identification information with the second execution authentication information,

determines whether the execution authentication information that is input by the user is coincident with the first execution authentication information or the second execution authentication information stored by the storage,

transmits the first program identification information to a transmission management system when it is determined that the execution authentication information that is input by the user is coincident with the first execution authentication information, and transmits the second program identification information to the transmission management system when it is determined that the execution authentication information that is input by the user is coincident with the second execution authentication information.

8. A method of transmitting a program by a transmission terminal which transmits content data to another transmission terminal via a network, the method comprising:

requesting a user to input execution authentication information when an authentication medium is connected with the transmission terminal, the authentication medium including a storage storing first program identification information identifying a first program and first execution authentication information indicating information requested to be input when the first program is executed in such a manner as to associate the first program identification information with the first execution authentication information, and storing second program identification information identifying a second program different from the first program and second execution authentication information indicating information requested to be input when the second program is executed in such a manner as to associate the second program identification information with the second execution authentication information;

determining whether the execution authentication information that is input by the user is coincident with the first execution authentication information or the second execution authentication information stored by the storage; and

transmitting the first program identification information to a transmission management system when determining that the execution authentication information that is input by the user is coincident with the first execution authentication information, and transmitting the second program identification information to the transmission management system when determining that the execution authentication information that is input by the user is coincident with the second execution authentication information.

9. The transmission system as claimed in claim **1**, wherein the first program and the second program correspond to programs for maintenance.

10. The transmission system as claimed in claim **1**, wherein the first program corresponds to a program for fault diagnostics, and the second program corresponds to a program for updating firmware.

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